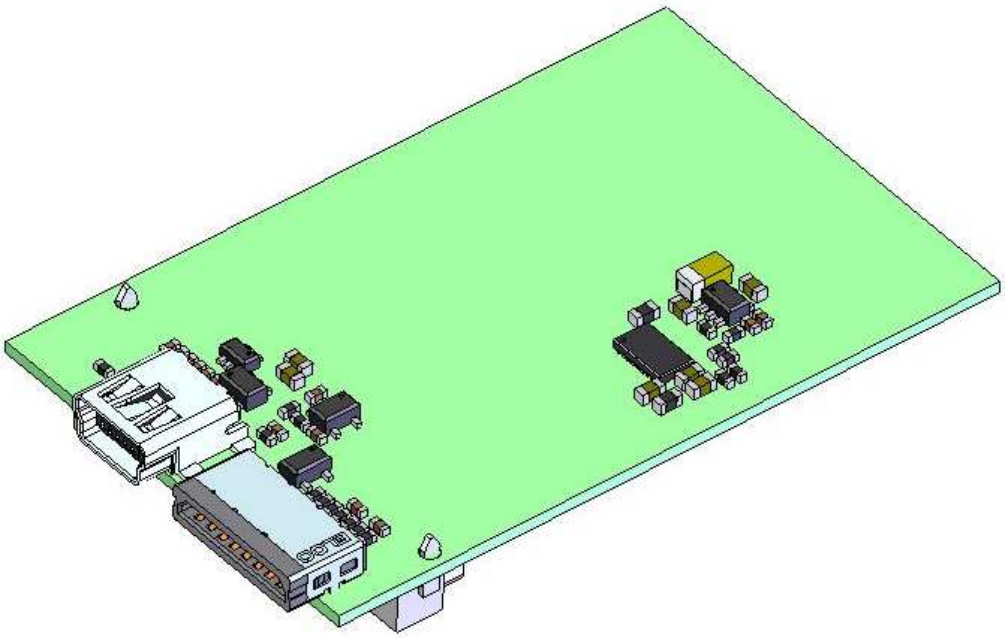
Plug and Play Fastrack Supreme Wireless CPU®

IESM-IO+USB User Guide

Reference: WA_DEV_Fastrk_UGD_006
Revision: 001
Date: 14 March, 2007



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Document History

Revision	Date	List of revisions	
001	14March, 07	First Issue	

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Overview

The Internal Expansion Socket Module (IESM) is a Plug & Play device to expand the functionality of a standard Fastrack Supreme 10 and Fastrack Supreme 20 into a state of the art IO+USB device for machine to machine applications.

With the IESM it is possible to utilize the Internal Expansion Socket (IES) which opens wide applications for Fastrack Supreme 10 and Fastrack Supreme 20 by simply plugging in.

Fastrack Supreme with IESM-IO+USB plugged-in may utilize one or more Open AT® Plug-Ins of the powerful Open AT® software suite. Open AT® is the world's most comprehensive cellular development environment, which allows embedded standard ANSI C applications to be natively executed directly on the Wireless CPU®.

Topics covered by this document;

- General description
- Functional description
- Basic services available
- Technical characteristics
- Installing and using the IESM-IO+USB
- User-level troubleshooting
- Recommended accessories to be used with the product

Note:

This document covers the Supreme IESM-IO+USB Plug & Play alone and does not include;

- The programmable capabilities provided via the use of Open AT® Software Suites.
- The development guide for IESM for expanding the application feature through the IES interface.

For details, please refer to the documents shown in the "Reference documents" section.

RoHS Directive

The Supreme and IESM-IO+USB are now compliant with RoHS Directive 2002/95/EC, which sets limits for the use of certain restricted hazardous substances. This directive states that "from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE)".

Plug & Plays which are compliant with this directive are identified by the RoHS logo on their label.

Disposing of the product

This electronic product is subject to the EU Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE). As such, this product must not be disposed off at a municipal waste collection point. Please refer to local regulations for directions on how to dispose off this product in an environmental friendly manner.

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Cautions

Information furnished herein by WAVECOM is accurate and reliable. However, no responsibility is assumed for its use. Please read carefully the safety recommendations given in Chapter 10 for an application based on Fastrack Supreme Plug & Play.

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Web Site Support

General information about Wavecom and its range of products:	www.wavecom.com
Specific support is available for the Fastrack Supreme Plug & Play Wireless CPU®:	www.wavecom.com/FastrackSupreme
Carrier/Operator approvals:	www.wavecom.com/approvals
Open AT® Introduction:	www.wavecom.com/OpenAT
Developer support for software and hardware:	www.wavecom.com/forum

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Contents

1 REFERENCES 11

1.1 Reference Documents 11
1.1.1 Open AT® Software Documentation 11
1.1.2 AT Software Documentation (TB Updated with X.61) 11
1.1.3 Firmware Upgrade Documents 11
1.1.4 Fastrack Supreme Related Documents 11
1.1.5 Fastrack Supreme IESM Related Documents 11

1.2 Abbreviations 12

2 PACKAGING 15

2.1 Contents 15

2.2 Packaging Box 15

2.3 Production Sticker 16

3 GENERAL INFORMATION 18

3.1 Description 18

3.2 External Connections 19
3.2.1 16-Way IO Socket 19
3.2.2 Mini-USB Connector 20
3.2.3 IES 50-pin Connector 21

4 FEATURES AND SERVICES 22

4.1 Basic Features and Services 22

5 TECHNICAL CHARACTERISTICS 24

5.1 Mechanical Characteristics 24

6 USING IESM-IO+USB 25

6.1 Getting Started 25
6.1.1 Installing IESM-IO+USB 25
6.1.2 Quick Check 26

7 TROUBLESHOOTING 27

7.1 No Communication with IESM-IO+USB through the Serial Link 27

8 FUNCTIONAL DESCRIPTION 29

8.1 Architecture 29

8.2 Power Supply 29

Preliminary

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8.3 Auxiliary Serial Link (UART2) 30
8.4 USB 2.0 Interface 30
8.5 General Purpose Input/Output 31
8.6 SPI Bus 32
8.6.1.1 SPI configuration 32

9 ENVIRONMENTAL CHARACTERISTICS 33

9.1 Conformity 36

10 SAFETY RECOMMENDATIONS 37

10.1 General Safety 37
10.2 Vehicle Safety 37
10.3 Care and Maintenance 38
10.4 Your Responsibility 38

11 RECOMMENDED ACCESSORIES 38

12 ONLINE SUPPORT 39

Preliminary

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List of Figures

Figure 1: Complete package contents 15
Figure 2: Packaging box 16
Figure 3: Production sticker 17
Figure 4: IESM general description 18
Figure 5: 16-Way IO Expander Socket 19
Figure 6: USB connector 20
Figure 7: IESM 50-pin connector 21
Figure 8: Mechanical Characteristics 24
Figure 9: IESM-IO+USB Dimensions 24
Figure 10: IESM-IO+USB Mounting 25
Figure 11: Functional architecture 29

Preliminary

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List of Tables

.

Table 1: 16-Way IO Expander Description 19
Table 2: USB Pin Description 20
Table 3: IESM 50-pin connector description 21
Table 4: Basic features of IESM-IO+USB 22
Table 5: Solutions for no connection with Supreme through serial link 27
Table 6: Electrical characteristics 29
Table 7: Ranges of temperature 33
Table 8: Environmental standard constraints 34
Table 9: List of recommended accessories 38

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1 References

1.1 Reference Documents

For more details, several reference documents may be consulted. The Wavecom reference documents are provided in the Wavecom documents package contrary to the general reference documents, which are not Wavecom owned.

1.1.1 Open AT® Software Documentation

[1] Getting started with Open AT® (Ref.WM_ASW_OAT_CTI_001)

[2] Open AT® Tutorial (Ref.WM_ASW_OAT_UGD_001)

[3] Tools Manual (Ref. WM_ASW_OAT_UGD_003)

[4] Open AT® Basic Development Guide (Ref. WM_ASW_OAT_UGD_002)

[5] Open AT® ADL guide (Ref. WM_ASW_OAT_UGD_006)

[6] Open AT® Customer Release Note (Ref. WM_ASW_OAT_DVD_00062)

1.1.2 AT Software Documentation (TB Updated with X.61)

[7] AT commands interface Guide for X51 (Ref. WM_ASW_OAT_UGD_00016)

[8] Customer Release Note X51 (Ref. WM_ASW_OAT_DVD_00120)

1.1.3 Firmware Upgrade Documents

[9] Firmware upgrade procedure (Ref. WM_SW_GEN_UGD_001)

1.1.4 Fastrack Supreme Related Documents

[10] Fastrack Supreme User Guide (Ref. WA_DEV_Fastrk_UGD_001)

1.1.5 Fastrack Supreme IESM Related Documents

[11] IESM Product Technical Specifications
(Ref. WA_DEV_Fastrk_PTS_001)

Note:

New versions of software may be available. Wavecom recommends customers to check the web site for the latest documentation.

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1.2 Abbreviations

Abbreviation	Definition
AC	**A**lternating **C**urrent
ACM	**A**ccumulated **C**all **M**eter
AT	**AT**tention (prefix for Wireless CPU® commands)
CLK	**CL**oc**K**
CMOS	**C**omplementary **M**etal **O**xide **S**emiconductor
CS	**C**oding **S**cheme
CTS	**C**lear **T**o **S**end
dB	**D**eci**b**el
dBc	**D**eci**b**el relative to the **C**arrier power
dBi	**D**eci**b**el relative to an **I**sotropic radiator
dBm	**D**eci**b**el relative to one **m**illiwatt
DC	**D**irect **C**urrent
DCD	**D**ata **C**arrier **D**etect
DCE	**D**ata **C**ommunication **E**quipment
DCS	**D**igital **C**ellular **S**ystem
DSR	**D**ata **S**et **R**eady
DTE	**D**ata **T**erminal **E**quipment
DTMF	**D**ual **T**one **M**ulti-**F**requency
DTR	**D**ata **T**erminal **R**eady
EEPROM	**E**lectrically **E**rasable **P**rogrammable **R**ead-**O**nly **M**emory
EFR	**E**nhanced **F**ull **R**ate
E-GSM	**E**xtended **GSM**
EMC	**E**lectro**M**agnetic **C**ompatibility
EMI	**E**lectro**M**agnetic **I**nterference
ESD	**E**lectro**S**tatic **D**ischarges
ETSI	**E**uropean **T**elecommunications **S**tandards **I**nstitute
FIT	**Series of connectors (micro-FIT)**
FR	**F**ull **R**ate
FTA	**F**ull **T**ype **A**pproval
GCF	**G**lobal **C**ertification **F**orum
GND	**G**rou**ND**
GPIO	**G**eneral **P**urpose **I**nput **O**utput
GPRS	**G**eneral **P**acket **R**adio **S**ervice

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Abbreviation	Definition
GPS	**G**lobal **P**ositioning **S**ystem
GSM	**G**lobal **S**ystem for **M**obile communications
HR	**H**alf **R**ate
I	**I**nput
IEC	**I**nternational **E**lectrotechnical **C**ommission
IES	**I**nternal **E**xpansion **S**ocket
IESM	**I**nternal **E**xpansion **S**ocket **M**odule
IMEI	**I**nternational **M**obile **E**quipment **I**dentification
I/O	**I**nput / **O**utput
LED	**L**ight **E**mitting **D**iode
MAX	**MAX**imum
ME	**M**obile **E**quipment
MIC	**MIC**rophone
Micro-Fit	**Family of connectors from Molex**
MIN	**MIN**imum
MNP	**M**icrocom **N**etworking **P**rotocol
MO	**M**obile **O**riginated
MS	**M**obile **S**tation
MT	**M**obile **T**erminated
NOM	**NOM**inal
O	**O**utput
Pa	**Pa**scal (for speaker sound pressure measurements)
PBCCH	**P**acket **B**roadcast **C**ontrol **CH**annel
PC	**P**ersonal **C**omputer
PCL	**P**ower **C**ontrol **L**evel
PDP	**P**acket **D**ata **P**rotocol
PIN	**P**ersonal **I**dentity **N**umber
PLMN	**P**ublic **L**and **M**obile **N**etwork
PUK	**P**ersonal **U**nblocking **K**ey
RF	**R**adio **F**requency
RFI	**R**adio **F**requency **I**nterference
RI	**R**ing **I**ndicator
RMS	**R**oot **M**ean **S**quare
RTS	**R**equest **T**o **S**end
RX	**R**eceive
SIM	**S**ubscriber **I**dentification **M**odule

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Abbreviation	Definition
SMA	**S**ub**M**iniature version **A** RF connector
SMS	**S**hort **M**essage **S**ervice
SNR	**S**ignal-to-**N**oise **R**atio
SPL	**S**ound **P**ressure **L**evel
SPK	**Sp**ea**K**er
SRAM	**S**tatic **RAM**
TCP/IP	**T**ransmission **C**ontrol **P**rotocol / **I**nternet **P**rotocol
TDMA	**T**ime **D**ivision **M**ultiple **A**ccess
TU	**T**ypical **U**rban fading profile
TUHigh	**T**ypical **U**rban, **High** speed fading profile
TX	**T**ransmit
TYP	**TYP**ical
USB	**U**niversal **S**erial **B**us
VSWR	**V**oltage **S**tationary **W**ave **R**atio

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2 Packaging

2.1 Contents

The complete package contents of the IESM-IO+USB consists of the following:

- One packaging box (**A**),
- One IESM-IO+USB (**B**),
- One Backplate (**C**),
- Short notice (**E**) with:
  - a summary of the main technical features,
  - safety recommendations,
  - EC declaration of conformity.

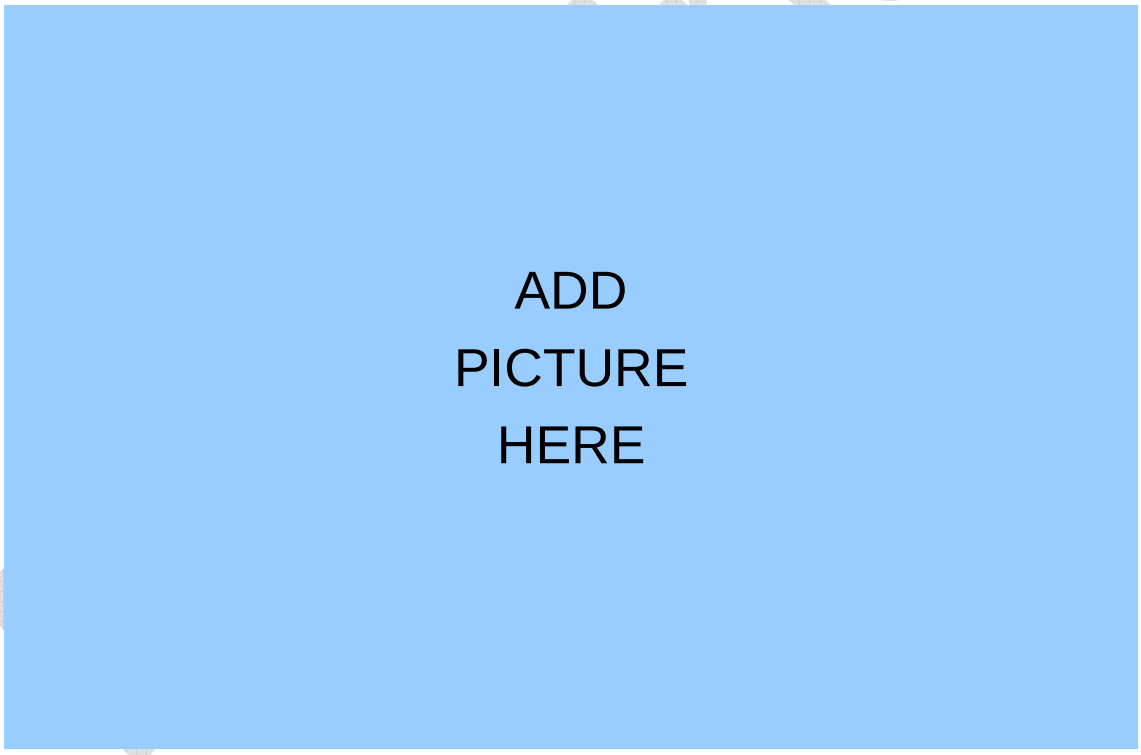

Figure 1: Complete package contents

2.2 Packaging Box

The packaging box external dimensions:

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- width: xx.xx mm
- height: xx.xx mm
- length: xx.xx mm

Label placed indicates:

- WAVECOM logo
- Product reference (IESM-IO+USB)
- CE marking (CEXXXX→TBC)
- RoHS logo
- WEEE logo

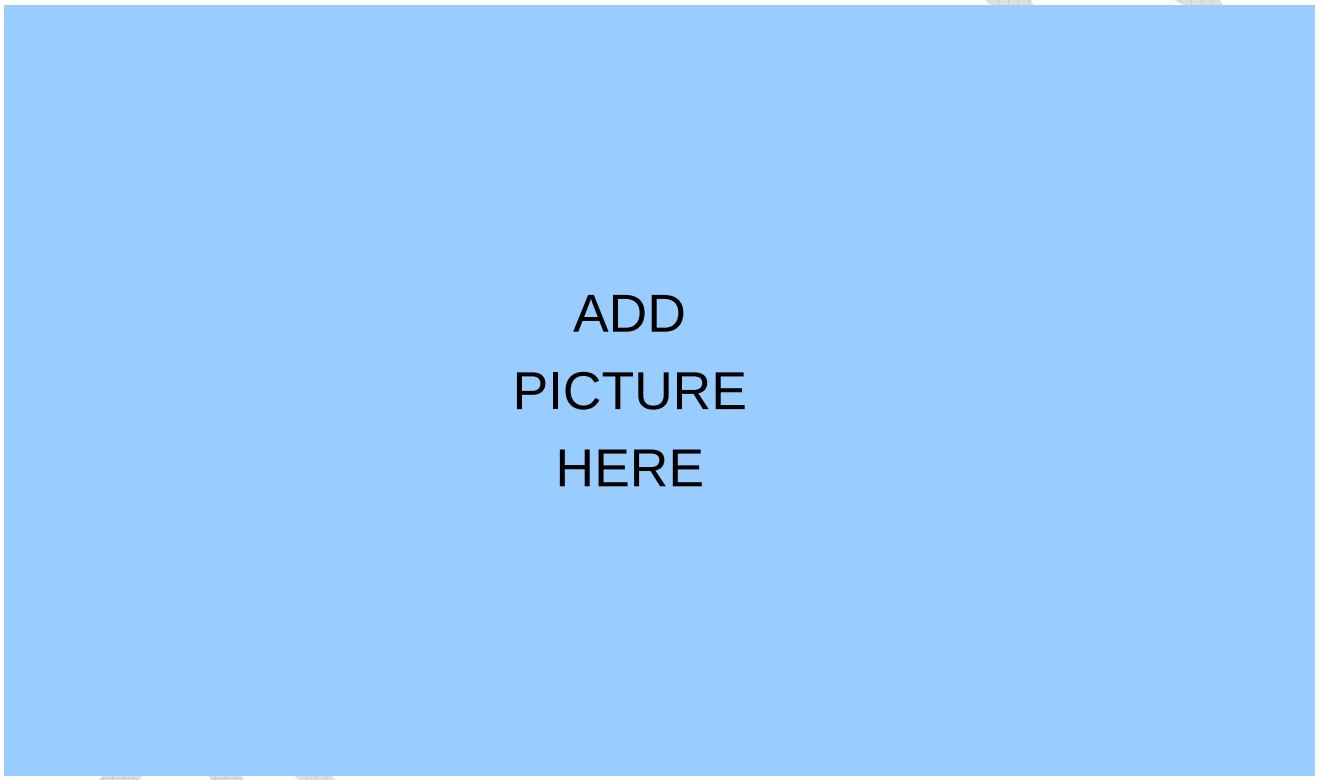

Figure 2: Packaging box

The packaging label dimensions are:

- height: XX mm
- length: XX mm

2.3 Production Sticker

A production sticker (see Figure 3) located at the back side with the following information:

- product reference (IESM),

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- part number (WMxxxxx),
- CE marking (CEXXXX → TBC),
- RoHS logo,
- WEEE logo.

ADD PICTURE HERE

Figure 3: Production sticker

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3 General Information

3.1 Description

The IESM-IO+USB description is shown below.

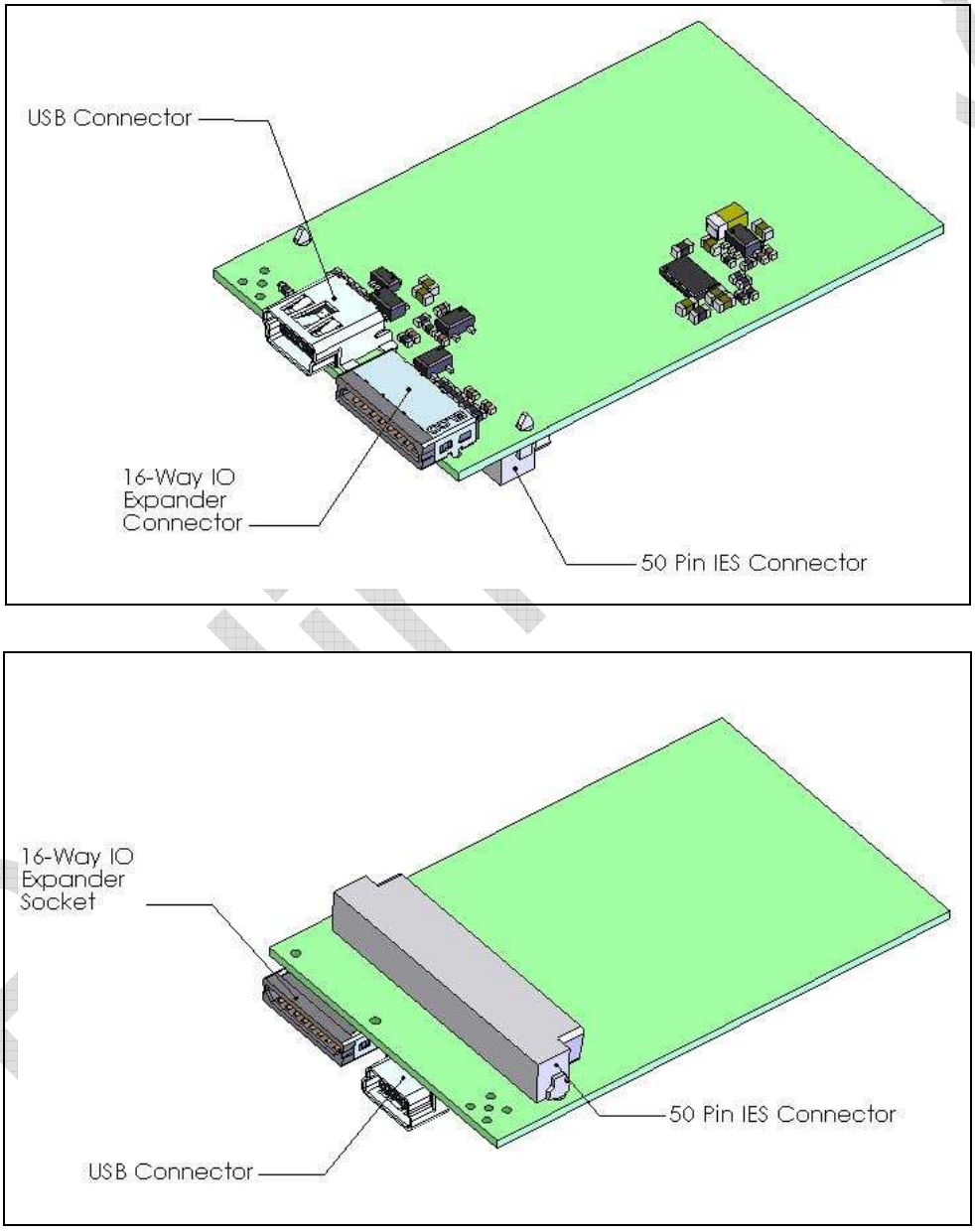

Figure 4: IESM general description

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3.2 External Connections

3.2.1 16-Way IO Socket

The 16-Way IO expander socket is an external interface for the IESM for customer's applications.

Available on this socket;

- 1 - UART2 (TXD2, RXD2, CTS2, RTS2)
- 5 - GPIOs
- 1 – AUX-DAC
- 1 – AUX-DAC
- 1 – SPI1 (SPI1-IO, SPI-I1, SPI1-CLK, SPI1-CS)

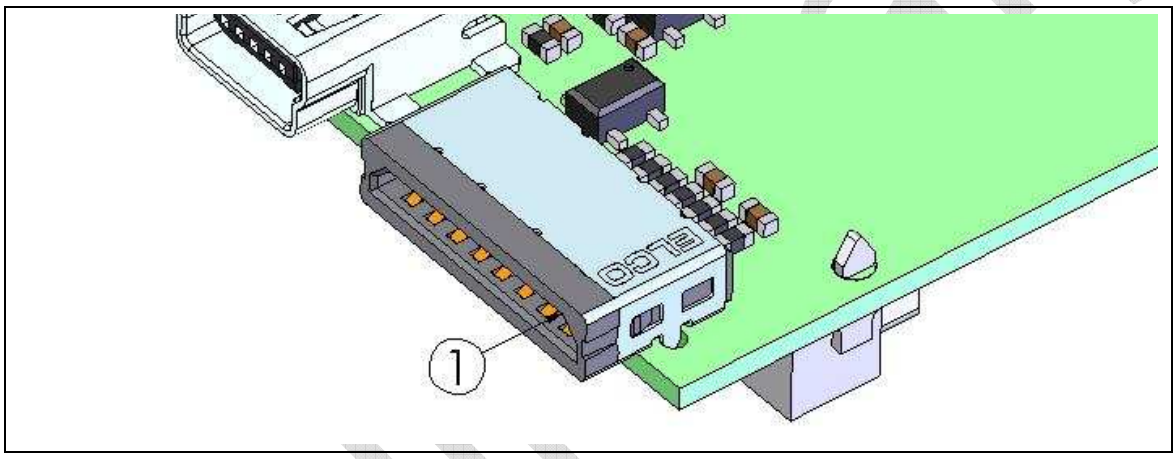

Figure 5: 16-Way IO Expander Socket

Table 1: 16-Way IO Expander Description

Pin #	Pin Description	Pin #	Pin Description
1	RXD2	9	GPIO26
2	TXD2	10	AUX-DAC
3	CTS2	11	AUX-ADC
4	RTS2	12	SPI1-IO
5	GPIO23	13	SPI1-I
6	GPIO20	14	SPI1-CLK
7	GPIO27	15	SPI1-CS
8	GPIO19	16	GND

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3.2.2 Mini-USB Connector

Standard Mini-USB connector for communicating with:

- Wireless CPU

This port is USB 2.0 compliant.

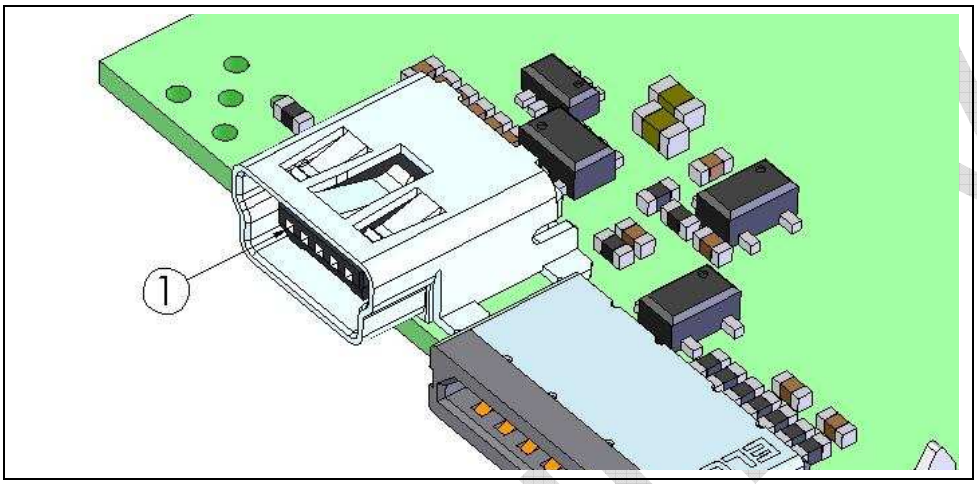

Figure 6: USB connector

Table 2: USB Pin Description

Pin #	Pin Description
1	VBUS
2	D-
3	D+
4	NC
5	GND

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3.2.3 IES 50-pin Connector

IESM high density 50-pin connector is used for:

- Interface with Fastrack Supreme motherboard

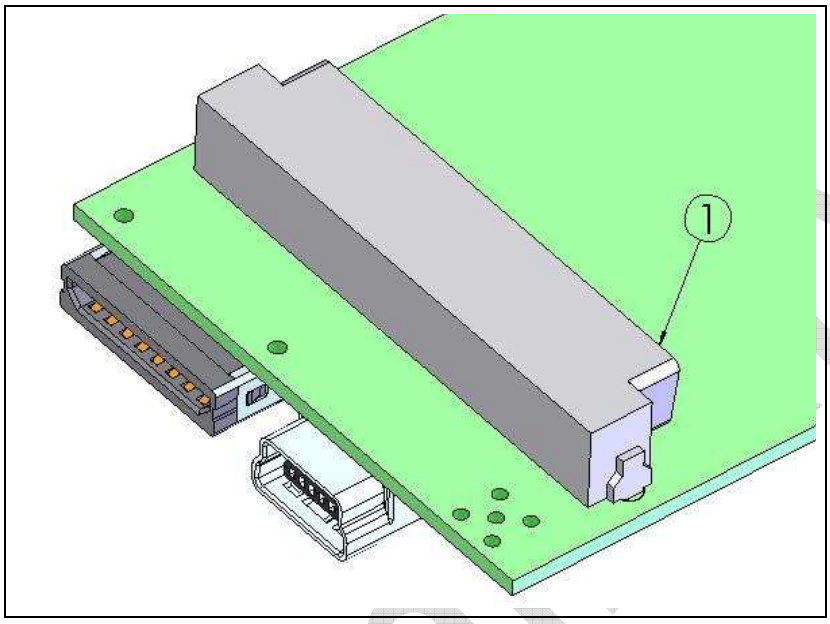

Figure 7: IESM 50-pin connector

Table 3: IESM 50-pin connector description

Pin #	Pin Description	Pin #	Pin Description
1	GND	26	RTS2
2	GND	27	UART2-EN
3	Reserved	28	GPIO26
4	Reserved	29	GPIO19
5	Reserved	30	GPIO27
6	Reserved	31	GPIO20
7	VPAD-USB	32	INT0/GPIO3
8	USB-DP	33	GPIO23
9	USB-DM	34	GPIO22
10	GSM-1V8	35	DTR1-CT108/2
11	GSM-2V8	36	PCM-SYNC
12	BOOT	37	PCM-IN
13	RESET	38	PCM-CLLK

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14	AUX-ADC	39	PCM-OUT
15	SPI1-CS	40	AUX-DAC
16	SPI1-CLK	41	VCC-2V8
17	SPI1-I	42	GND
18	SPI1-IO	43	DC-IN
19	SPI2-CLK	44	DC-IN
20	SPI2-IO	45	GND
21	SPI2-CS	46	4V
22	SPI2-I	47	4V
23	RXD2	48	GND
24	TXD2	49	GND
25	CTS2	50	GND

4 Features and Services

4.1 Basic Features and Services

Basic features of the IESM-IO+USB are summarized in the table below.

Table 4: Basic features of IESM-IO+USB

Features	Description
Open AT®	Open AT® programmable: Native execution of embedded standard ANSI C applications, Custom AT command creation, Custom application library creation, Standalone operation.

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Features	Description
Interfaces	USB 2.0 Compliant RS232 (V.24/V.28) Serial interface supporting: ▪ Baud rate (bits/s): 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 General Purpose Input/Output gates (GPIOs) ▪ 2.8V gates Digital to Analog **C**onverter (DAC) ▪ 8-bit resolution, ranging from 0 to 2.3V Analog to Digital Converter (ADC) ▪ 10-bit resolution, ranging from 0 to 2V SPI Bus ▪ Master mode ▪ 101.5Kbit/s to 13Mbit/s ▪ 3 or 4 wire interface ▪ SPI mode configuration, 0 to 3 ▪ 1 to 16 bits data lengths AT command set based on V.25ter and GSM 07.05 & 07.07. Open AT® interface for embedded application.

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5 Technical Characteristics

5.1 Mechanical Characteristics

Figure 8: Mechanical Characteristics

PCB Dimensions	57mm x 35.7mm x 1mm
Overall Dimension	59.5 x 35.7 x 10.01mm (including connectors)
Weight	≈ TBD grams

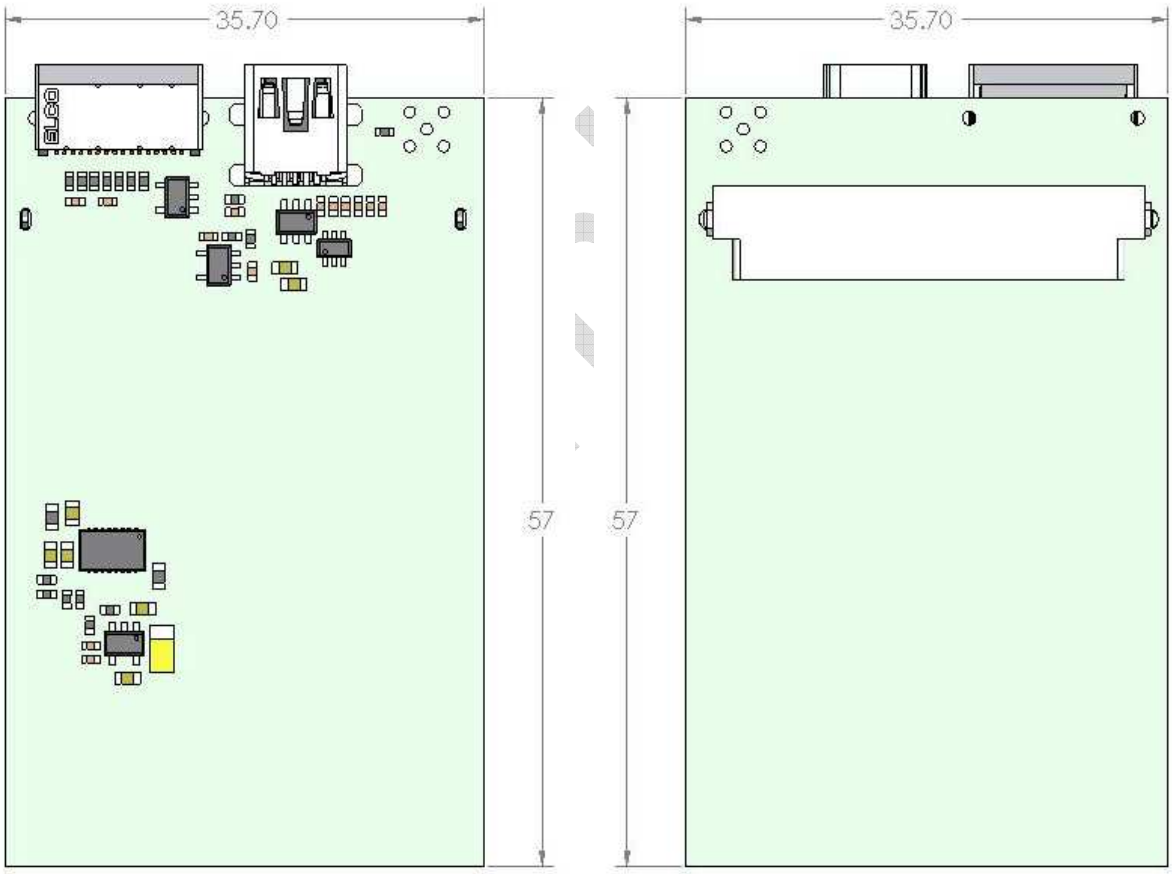

Figure 9: IESM-IO+USB Dimensions

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6 Using IESM-IO+USB

6.1 Getting Started

6.1.1 Installing IESM-IO+USB

To install the IESM-IO+USB please follow the procedures below. It is important to remove the power on the Fastrack Supreme when performing this installation;

1. Remove the screws and the original backplate cover of the Fastrack Supreme
2. Insert the IESM-IO+USB board. Replace the original backplate with the IESM-IO+USB backplate provided and place back the screws.

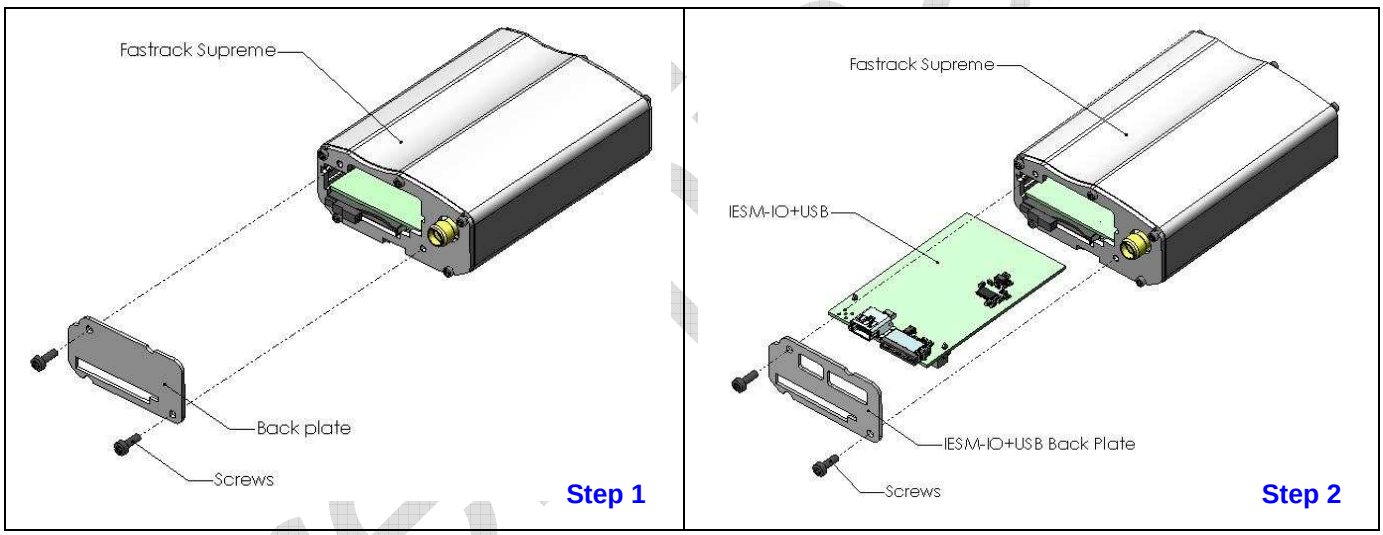

Figure 10: IESM-IO+USB Mounting

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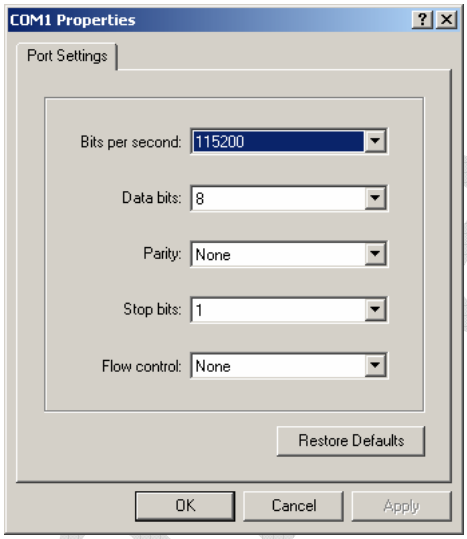
6.1.2 Quick Check

To check if the installation of the IESM-IO+USB with Fastrack Supreme is ok, please perform a simple test on USB.

1 Connect a serial cable between Fastrack Supreme and PC COM port

2 Apply power on Fastrack Supreme

3 Open communication software (Hyperterminal), if COM port not configured yet please enter as follows;



4 Activate the USB port, enter AT command shown below;

AT+WMFM=0,1,3

5 Connect USB cable between IESM and PC

6 PC running Windows should detect the new USB device. It will prompt to install the USB driver.

7 Install the USB driver on Fastrack Supreme, driver could be found on CD provided.

8 Once USB driver is installed, open a new connection this time configure it to use the USB port

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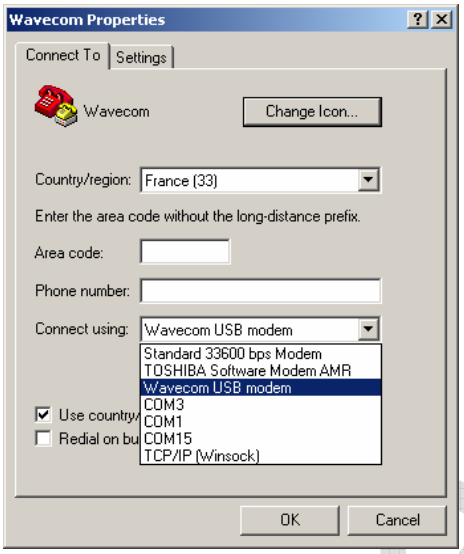

9 On the new communication window type the AT command shown below. This will echo on the screen what is being typed;

ATE1➔ Fastrack Supreme responds “OK”

10 Enter the AT command as indicated below to enable USB;

AT+CGMI ➔ Fastrack Supreme responds “WAVECOM MODEM”

IESM is now properly installed. For further information on these AT commands and their associated parameters, refer to "AT Commands Interface Guide" [7].

7 Troubleshooting

This section of the document describes possible problems encountered when using the IESM-IO+USB.

To review other troubleshooting information, refer the ‘FAQs’ (Frequently Asked Questions) page at www.wavecom.com or use the following link:
http://www.wavecom.com/support/faqs.php

7.1 No Communication with IESM-IO+USB through the Serial Link

If the Fastrack Supreme or IESM-IO+USB does not answer to AT commands through the USB or serial link, refer to the table below for possible causes and solutions.

Table 5: Solutions for no connection with Supreme through serial link

Symptoms	Check if	Action
Fastrack Supreme UART no response	• Serial cable is connected on both sides?	• Check the serial cable connection
	• Power is applied?	• Check Power Cable • Check Fuse

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USB not detected	• USB cable properly inserted?	• Unplug cable from PC. Then plug back again if possible on another USB port on the PC.
	• IESM powered properly?	• Make sure the IESM is plugged securely to the Fastrack Supreme
IESM UART no response	• IESM powered properly?	• Make sure the IESM is plugged securely to the Fastrack Supreme
	• The communication program properly configured on PC?	• Ensure the setting of the communication program is fit to the following settings; • Fastrack Supreme UART 1 factory setting is: ▪ Data bits = 8 ▪ Parity = none ▪ Stop bits = 1 ▪ Baud = 115 200 bps ▪ Flow control = hardware
	• There is another program interfering with the communication program (i.e. Conflict on communication port access)	• Close the interfering program.

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8 Functional Description

The IESM-IO+USB is interfaced to the Fastrack Supreme 10/20 mother board through the 50 pin connector. All the DC supplies are applied through this connector so no external supply is necessary.

An RS232 V.24/V.28 compliant transceiver is placed on UART2. USB is a four wire slave interface that complies with USB 2.0 protocol signaling. Both communication interfaces can be used to communicate with the Wireless CPU.

GPIOs, DAC, ADC and SPI bus are transparent from the 50 pin IES connector to the 16-Way IO Expander Socket.

8.1 Architecture

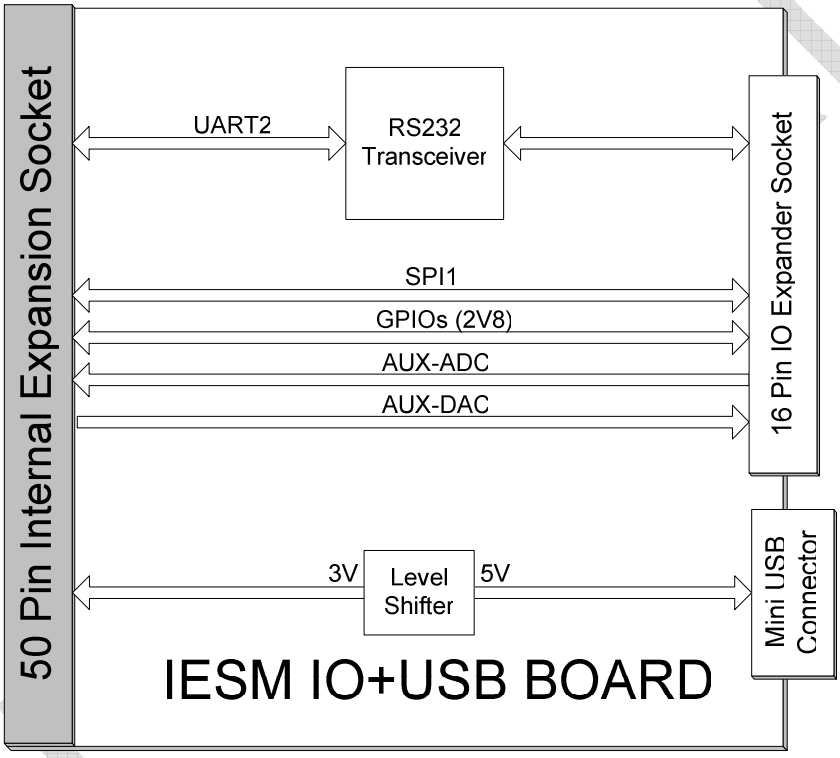

Figure 11: Functional architecture

8.2 Power Supply

Table 6: Electrical characteristics

Operating Voltage	4VDC

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	1.2VDC
	2.8VDC
Maximum current	**(TBC)**

8.3 Auxiliary Serial Link (UART2)

The IESM-IO+USB have internal RS232 transceiver for UART2 and V.24/V.28 compliant.

This interface is internally protected (by ESD protection) against electrostatic surges on the RS232 lines.

Filtering guarantees:

- EMI/RFI protection in input and output,
- Signal smoothing.

Signals available on the RS232 serial link are:

- TX data (CT103/TXD2),
- RX data (CT104/RXD2),
- Request To Send (CT105/RTS2)
- Clear To Send (CT106/CTS2)

Pin description of UART2 interface

Signal	16-Way IO Expander Pin number	I/O	IO Type RS232 STANDARD	Description
CT103 / TXD2	2	I	TX	Transmit serial data
CT104 / RXD2	1	O	RX	Receive serial data
~CT106 / CTS2	4	O	CTS	Clear To Send
~CT105 / RTS2	3	I	RTS	Request To Send

Fatrack Supreme 10/20 is designed to operate using all the serial interface signals. In particular, it is mandatory to use RTS and CTS for hardware flow control in order to avoid data corruption during transmission.

8.4 USB 2.0 Interface

Is a 4-wire Mini USB slave interface that complies with USB 2.0.

The USB interface signals are VPAD-USB, USB-DP, USB-DM and GND.

USB interface features:

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- 12Mbit/s full-speed transfer rate
- 5V typ compatible
- USB Softconnect feature
- Download feature is not supported by USB
- CDC 1.1 – ACM compliant

Pin description of the USB interface

Signal	Mini USB Pin number	I/O	I/O type USB Standard	Description
VPAD-USB	1	I	VBUS	+5V USB Power Supply
USB-DM	2	I/O	D-	Differential data interface negative
USB-DP	3	I/O	D+	Differential data interface positive
ID	4	-	-	NC
GND	5	-	GND	Ground

8.5 General Purpose Input/Output

The IESM-IO+USB have 5 GPIOs available on the 16-Way IO Expander Socket. Which can be use for external applications, these are;

- GPIO19
- GPIO20
- GPIO23
- GPIO26
- GPIO27

These GPIOs can be controlled by AT commands:

- **AT+WIOW** for a write access to the GPIO value, when the GPIO is used as an output,
- **AT+WIOR** for a read access to the GPIO value, when the GPIO is used as an input.

Refer to "AT Commands Interface Guide" [7] for further information on AT commands.

After reset, both GPIOs are configured as inputs. The **AT+WIOM** command has to be used to change this configuration (refer to "AT Commands Interface Guide" [7] for further details).

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Signal	16-Way IO Expander Pin number	I/O	Voltage	Reset State	Multiplex with
GPIO19	8	I/O	2V8	Z	Not mux
GPIO20	6	I/O	2V8	Undefined	Not mux
GPIO23	5	I/O	2V8	Z	Not mux
GPIO26	9	I/O	Open Drain	Z	SCL
GPIO27	7	I/O	Open Drain	Z	SDA

8.6 SPI Bus

SPI bus interfaces include:

- A CLK signal
- An I/O signal
- An I signal
- A CS signal complying with the standard SPI bus.

SPI bus characteristics:

- Master mode operation
- SPI speed is from 101.5 Kbit/s to 13 Mbit/s in master mode operation
- 3 or 4-wire interface
- SPI-mode configuration: 0 to 3
- 1 to 16 bits data length

Note: The SPI Bus is must run with Open AT®. Please consult Open AT Development Guide [4] for more information.

AC characteristics

Signal	Description	Minimum	Typ	Maximum	Unit
CLK-cycle	SPI clock frequency	0.1015		13	MHz
Data-OUT delay	Data out ready delay time			10	ns
Data-IN-setup	Data in setup time	2			ns
Data-OUT-hold	Data out hold time	2			ns

8.6.1.1 SPI configuration

Operation	Maximum	SPI-	Duplex	3-wire type	4-wire type

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	Speed	Mode			
Master	13 Mb/s	0,1,2,3	Half	SPI1-CLK; SPI1-IO; ~SPI1-CS	SPI1-CLK; SPI1-IO; SPI1-I; ~SPI1-CS

Pin description

Signal	Pin number	I/O	I/O type	Reset state	Description	Multiplexed with
SPI1-CLK	16	O	2V8	Z	SPI Serial Clock	GPIO28
SPI1-IO	18	I/O	2V8	Z	SPI Serial input/output	GPIO29
SPI1-I	17	I	2V8	Z	SPI Serial input	GPIO30
~SPI1-CS	15	O	2V8	Z	SPI Enable	GPIO31

9 Environmental Characteristics

The IESM-IO+USB is compliant with the following operating class. To ensure the proper operation of the IESM-IO+USB, the temperature of the environment must be within a specific range as described in the table below.

Table 7: Ranges of temperature

Conditions	Temperature range
Operating Class A	-20 ℃ to +55℃
Operating / Storage / Class B	-40 ℃ to +85℃

Function Status Classification:

Class A: [TBD]

The IESM-IO+USB remain fully functional across the specified temperature range.

Class B: [TBD]

The IESM-IO+USB remain fully functional, across the specified temperature range. Some parameters may occasionally deviate from the specified requirements and this deviation does not affect the ability of the IESM-IO+USB to function fully, as it does within the Class A range.

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The detailed climatic and mechanics standard environmental constraints applicable to the Fastrack Supreme are listed in the table below:

Table 8: Environmental standard constraints

Environmental Tests (IEC TR 60721-4)		**Environmental Classes (IEC 60721-3)**			
Tests	**Standards**	**Storage (IEC 60721-3-1) Class IE13**	**Transportation** (IEC 60721-3-2) Class IE23	**Operation**	
				Stationary (IEC 60721-3-3) **Class IE35**	Non-Stationary **(IEC 60721-3-7) Class IE73**
Cold	IEC 60068-2-1 : Ab/Ad	-25°C, 16 h	-40°C, 16 h	-5°C, 16 h	-5°C, 16 h
Dry heat	IEC 60068-2-2 : Bb/Bd	+70°C, 16 h	+70°C, 16 h	+55°C, 16 h	+55°C, 16 h
Change of temperature	IEC 60068-2-14 : Na/Nb	-33°C to ambient 2 cycles, t1=3 h 1 °C.min $^{-1}$	-40°C to ambient 5 cycles, t1=3 h t2<3 min	-5°C to ambient 2 cycles, t1=3 h 0,5 °C.min $^{-1}$	-5°C to ambient 5 cycles, t1=3 h t2<3 min
Damp heat	IEC 60068-2-56 : Cb	+30°C, 93% RH 96 h	+40°C, 93% RH 96 h minimum	+30°C, 93% RH, 96 h	+30°C, 93% RH, 96 h
Damp heat, cyclic	60068-2-30 : Db Variant 1 or 2	+40°C, 90% to 100% RH One cycle Variant 2	+55°C, 90% to 100% RH Two cycles Variant 2	+30°C, 90% to 100% RH Two cycles Variant 2	+40°C, 90% to 100% RH Two cycles Variant 1
Vibration (sinusoidal)	IEC 60068-2-6 : Fc	1-200 Hz 2 m.s^{-2} 0,75 mm 3 axes 10 sweep cycles	1-500 Hz 10 m.s^{-2} 3,5 mm 3 axes 10 sweep cycles	1-150 Hz 2 m.s^{-2} 0,75 mm 3 axes 5 sweep cycles	1-500 Hz 10 m.s^{-2} 3,5 mm 3 axes 10 sweep cycles
Vibration (random)	IEC 60068-2-64 : Fh	-	10-100 Hz / 1,0 m^2.s^{-3} 100-200 Hz / -3 dB.octave^{-1} 200-2000 Hz / 0,5 m^2.s^{-3} 3 axes 30 min	-	-
Shock (half-sine)	IEC 60068-2-27 : Ea	-	-	50 m.s^{-2} 6 ms 3 shocks 6 directions	150 m.s^{-2} 11 ms 3 shocks 6 directions
Bump	IEC 60068-2-29 : Eb	-	250 m.s^{-2} 6 ms 50 bumps vertical direction	-	-
Free fall	ISO 4180-2	-	Two falls in each specified attitude	-	2 falls in each specified attitude 0,025 m (<1kg)
Drop and topple	IEC 60068-2-31 : Ec	-	One drop on relevant corner One topple about each bottom edge	-	One drop on each relevant corner One topple on each of 4 bottom edges

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Notes:

Short description of Class IE13 (*For more information see standard IEC 60721-3-1)*

"Locations without controlled temperature and humidity, where heating may be used to raise low temperatures, locations in buildings providing minimal protection against daily variations of external climate, prone to receiving rainfall from carrying wind".

Short description of Class IE23 (*For more information, see standard IEC 60721-3-2)*

"Transportation in unventilated compartments and in conditions without protection against bad weather, in all sorts of trucks and trailers in areas of well developed road network, in trains equipped with buffers specially designed to reduce shocks and by boat".

Short description of Class IE35 (*For more information see standard IEC 60721-3-3)*

"Locations with no control on heat or humidity where heating may be used to raise low temperatures, to places inside a building to avoid extremely high temperatures, to places such as hallways, building staircases, cellars, certain workshops, equipment stations without surveillance".

Short description of Class IE73 (*For more information see standard IEC 60721-3-7)*

"Transfer to places where neither temperature nor humidity are controlled but where heating may be used to raise low temperatures, to places exposed to water droplets, products can be subjected to ice formation, these conditions are found in hallways and building staircases, garages, certain workshops, factory building and places for industrial processes and hardware stations without surveillance".

Warning: The specification in the above table applies to the Supreme product only. Customers are advised to verify that the environmental specification of the SIM Card used is compliant with the Supreme environmental specifications. Any application must be qualified by the customer with the SIM Card in storage, transportation and operation.

The use of standard SIM cards may drastically reduce the environmental conditions in which the Product can be used. These cards are particularly sensible to humidity and temperature changes. These conditions may produce oxidation of the SIM card metallic layers and cause, in the long term, electrical discontinuities. This is particularly true in left alone applications, where no frequent extraction/insertion of the SIM card is performed.

In case of mobility when the application is moved through different environments with temperature variations, some condensation may appear. These events have a negative impact on the SIM and may favor oxidation.

If the use of standard SIM card, with exposition to the environmental conditions described above, can not be avoided, special care must be taken in the integration of the final application in order to minimize the impact of these conditions. The solutions that may be proposed are:

- Lubrication of the SIM card to protect the SIM Contact from oxidation.
- Putting the Supreme Plug & Play in a waterproof enclosure with desiccant bags.

Lubrication of the SIM card had been tested by Wavecom (using Tutela Fluid 43EM from MOLYDUVAL) and gives very good results.

If waterproof enclosure with a desiccant solution is used, check with your desiccant retailer the quantity that must be used according to the enclosure dimensions. Ensure humidity has been removed before sealing the enclosure.

Any solution selected must be qualified by the customer on the final application.

To minimize oxidation problem on the SIM card, its manipulation must be done with the greatest precautions. In particular, the metallic contacts of the card must never be touched with bare fingers or any matter which may contain polluted materials liable to produce oxidation (such as, e.g. substances including chlorine). In case a cleaning of the Card is necessary, a dry cloth must be used (never use any chemical substance).

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9.1 Conformity

The complete product complies with the essential requirements of article 3 of R&TTE 1999/5/EC Directive and satisfied the following standards:

Domain	Applicable standard
Safety standard	EN 60950 (ed.1999)
Efficient use of the radio frequency spectrum	EN 301 419-(v 4.1.1) EN 301 511 (V 7.0.1)
EMC	EN 301 489–1 (edition 2002) EN 301 489-7 (edition 2002)
Global Certification Forum – Certification Criteria	GCF-CC V3.13.0

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10 Safety recommendations

10.1 General Safety

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency (RF) interference. Please follow the safety advice given below carefully.

Switch OFF your Wireless CPU®:

- When in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, or legal action or both,
- When at a refueling point,
- When in any area with a potentially explosive atmosphere which could cause an explosion or fire,
- In hospitals and any other place where medical equipment may be in use.

Respect restrictions on the use of radio equipment in:

- Fuel depots,
- Chemical plants,
- Places where blasting operations are in progress,
- Any other area where signalization reminds that the use of cellular telephone is forbidden or dangerous.
- Any other area where you would normally be advised to turn off your vehicle engine.

There may be a hazard associated with the operation of your Supreme Plug & Play close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.

Operation of your Supreme Plug & Play close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

The Supreme Plug & Play is designed for and intended to be used in "***fixed***" and "***mobile***" applications:

- **"*Fixed*"** means that the device is physically secured at one location and is not able to be easily moved to another location.
- **"*Mobile*"** means that the device is designed to be used in other than fixed locations and generally in such a way that a separation distance of at least 20 cm (8 inches) is normally maintained between the transmitter's antenna and the body of the user or nearby persons.

The Supreme Plug & Play is not designed for and intended to be used in portable applications (within 20 cm or 8 inches of the body of the user) and such uses are strictly prohibited.

10.2 Vehicle Safety

Do not use your Supreme Plug & Play while driving, unless equipped with a correctly installed vehicle kit allowing 'Hands-Free' Operation.

Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.

If incorrectly installed in a vehicle, the operation of Supreme Plug & Play telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, make sure that the installation has been

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Preliminary

performed by a qualified personnel. Verification of the protection of vehicle electronics should form part of the installation.

The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

10.3 Care and Maintenance

Your Supreme Plug & Play is the product of advanced engineering, design and craftsmanship and should be treated with care. The suggestion below will help you to enjoy this product for many years.

Do not expose the Supreme Plug & Play to any extreme environment where the temperature or humidity is high.

Do not use or store the Supreme Plug & Play in dusty or dirty areas. Its moving parts (SIM holder for example) can be damaged.

Do not attempt to disassemble the Wireless CPU®. There are no user serviceable parts inside.

Do not expose the Supreme Plug & Play to water, rain or spilt beverages. It is not waterproof.

Do not abuse your Supreme Plug & Play by dropping, knocking, or violently shaking it. Rough handling can damage it.

Do not place the Supreme Plug & Play alongside computer discs, credit or travel cards or other magnetic media. The information contained on discs or cards may be affected by the Wireless CPU®.

The use of third party equipment or accessories, not made or authorized by Wavecom may invalidate the warranty of the Wireless CPU®.

Do contact an authorized Service Center in the unlikely event of a fault in the Wireless CPU®.

10.4 Your Responsibility

This Supreme Plug & Play is under your responsibility. Please treat it with care respecting all local regulations. It is not a toy. Therefore, keep it in a safe place at all times and out of the reach of children.

Try to remember your Unlock and PIN codes. Become familiar with and use the security features to block unauthorized use and theft.

11 Recommended Accessories

Accessories recommended by Wavecom for the IESM-IO+USB are given in the table below.

Table 9: List of recommended accessories

Designation	Part number	Supplier
16-Way IO Expander Plug	**10-9257-01000S [TBD]**	**AVX**

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12 Online Support

Wavecom provides an extensive range on online support which includes the following areas of Wavecom's wireless expertise:

- the latest version of this document
- new versions of our Operating System user guides
- comprehensive support for Open AT®
- regulatory certifications
- carrier certifications
- application notes

To gain access to this support, simply visit our web site at www.wavecom.com and click on "Support". Privileged access via user login is provided to Wavecom authorized distributors.

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